



POWER

Reducing your footprint

Tim Young at Netezza examines how some of Europe's leading organizations are reducing the physical footprint in their data centre, while saving on power and cooling requirements

Skyrocketing power costs and increasingly constrained power availability are forcing many companies to re-examine their IT strategies and budgets. With their intense workload – dozens or hundreds of processors and large numbers of whirring disk drives straining over massive queries – data warehouse systems based on general-purpose designs have long been one of the chief culprits. There is a power crisis in the data centre, largely the result of processing technology designed for general-purpose computing (web servers, email servers, OLTP servers, etc.). Today's tightly packed servers consume more power and give off more heat than their predecessors, as the latest generations of chips drive enormous amounts of data through microscopic circuitry. But is this type of computing – and the power it requires – optimal for data warehousing?

Heated debate

According to Moore's Law, the processing power of computer chips doubles about every 18 months – a pattern of innovation

that has been driving IT forward for decades. Unfortunately, this progress has a downside.

As processor performance has increased, so too has power consumption and its side effect - heat. Smaller servers packed with more-powerful components not only consume more electricity in their processing operations, they also generate more heat, requiring aggressive use of internal fans and air-conditioning that add a huge overhead to power consumption. Blade servers are a prime example – according to Gartner, a blade rack requires 10-15 times more power to operate than a standard rack, and the same power to cool.

As processing technology becomes smaller, faster and hotter, corporate data centres are consuming more electricity than ever before. Coupled with rising energy costs and a finite power grid, the result is an energy crisis affecting both individual companies as well as the power utilities that supply them. Companies are finding themselves at a power crossroads – either scale back growth plans, pay the astronomical cost of building an additional facility or relocate the data centre to a

region where power is less restricted.

Wasted real estate

There's another dimension to the power crunch: data centre space. As processing power in smaller form factors outpaces the ability of server vendors to keep their equipment cool, workarounds are needed that leave extra space for air to circulate around blades and systems. For example, Hewlett-Packard and IBM use complex configuration tools that limit the number of blades that can be installed in a rack to leave adequate spacing for cooling. Rather than filling racks to capacity, the customer is required to skip rows or slots to allow heat to dissipate – consuming valuable real estate in the data centre.

Smaller...faster...hotter

Data centre servers used for general-purpose computing (as well as PCs) are dominated by x86 architectures. This chip technology is at the heart of blade servers and rack servers – including those used in other data warehouse systems – and contains features designed to improve performance for general-purpose computing, such as cache memory to store results for upcoming operations.

But is this the right approach for data warehousing? A design that is ideal for processing 10 records related to a credit card transaction may be woefully inefficient when churning through 10 billion records to discover a pattern affecting the performance of your business. With billions of rows of data shuttling between storage and memory, and with a cache far too small to be effective on such a massive scale, the CPU is under a tremendous strain – with a corresponding increase in power requirements and heat.

On a typical 3.4 GHz processor chip found on blades and rack servers, a massive heat sink draws heat away from the chip like a car radiator. Fans pull air across the heat sink fins – which require their own electrical power source in addition to the power required to run the CPU. Even with this cooling apparatus, additional space is needed for air to circulate between the blades – driving up space requirements along with power consumption.

